A CLOTH STRAINER FOR HONEY CONDITIONING SYSTEMS

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A CLOTH STRAINER FOR HONEY CONDITIONING SYSTEMS

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Extracted honey must be freed of defects by some method of separation before it is marketed. (Defects refer to particles of wax, propolis, or other foreign material.) This removal can be most easily accomplished by the producer immediately after extraction, when there is little or no crystallization. The degree of removal of defects from the honey effected by the producer partially determines the grade of the honey.

Minimum grade standards must be met if the honey is packed directly in consumer containers, and the higher grades sell for higher prices. U.S. grade A standards require the honey to be at least as free of defects as honey that has been strained through a standard No. 80 sieve at a temperature of not more than 130° F.

Honey in bulk containers for sale to packers should be relatively free of particles of wax and propolis. In most instances this honey will be crystallized and will require liquefication for packing. Temperatures during the liquefying process may exceed the melting point of wax. Unless the wax particles have been removed the flavor of the honey may be damaged.

Defects may be removed from honey by the use of any of various types of strainers or by flotation. The method and equipment used depend on the size of operation and the facilities available. Regardless of the method used, the process will be aided by honey temperatures of 110° to 120° F. A rapid decrease in honey viscosity takes place as the honey temperature is raised from 90° to 120° F. This decrease in viscosity makes separation of the honey and foreign material easier and also aids in moving the honey through the system.

A cloth strainer for use in a continuous-flow honey conditioning system has been developed. This report tells how to build and operate it.

CONSTRUCTION

The strainer unit consists of a cloth sleeve supported by a framework mounted within a containing shell.

The containing shell is made of a piece of 7-inch-diameter tubing 27¾ inches long fitted with end covers. Flanges welded to each end of the tube provide a means of attaching the end cover and serve as guides for the strainer-cloth supporting framework to keep it in a position parallel to the containing shell. The top cover plate has a ⅛-inch pipe threaded port at the center where an air cock vent is in-

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stalled to bleed off and introduce air when filling and draining the strainer, respectively. A 6-inch length of tubing welded into a center hole in the bottom cover plate serves as the honey inlet, and a 6-inch length of tubing welded into a hole drilled in the containing shell near the top serves as the honey outlet. The tubing used for the honey inlet and outlet of the strainer should be the same size as the tubing used to convey the honey through the system. Construction details of the containing shell are shown in figure 1.

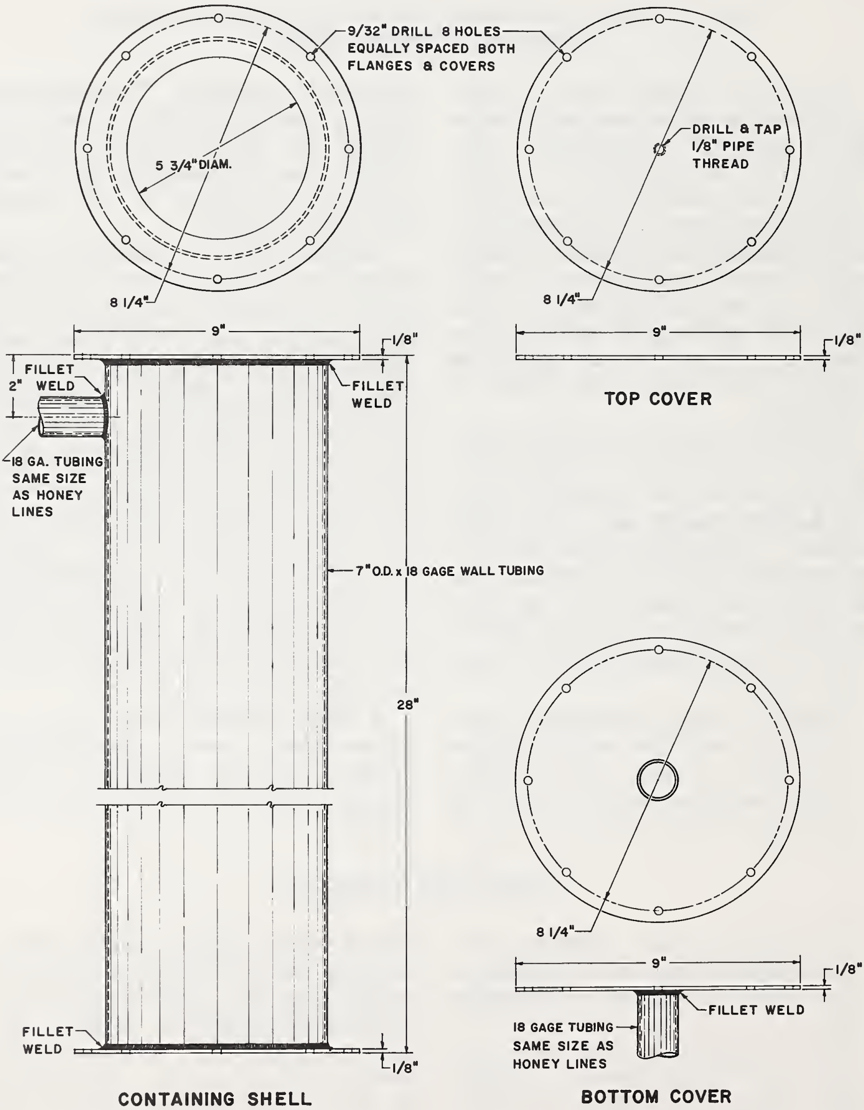

FIGURE 1.—Diagrams showing construction details of the containing shell of the strainer.

A framework to support the cloth strainer sleeve is made of two end rings connected by $\frac{3}{16}$-inch-diameter rods. The end rings are made of $5\frac{9}{16}$-inch-diameter tubing with 0.258-inch wall thickness or 5-inch schedule 40 pipe. Sixteen holes are drilled axially equal distance apart around the circumference of the end rings, and the rods are soldered into these holes. The top ring is 4 inches long so that it extends below the honey outlet tube and prevents the strainer cloth from being pulled into the outlet. The bottom ring is $1\frac{1}{2}$ inches long. Grooves are cut in the end rings. Neoprene "O" rings, held in place by the grooves, are used to hold the strainer cloth in place when it has been mounted in the framework. Figure 2 illustrates construction details of the strainer-cloth supporting frame.

Neoprene gaskets $\frac{1}{4}$-inch thick are used under each end plate to seal the containing shell and to seal each end of the supporting frame so that the honey must pass through the cloth between the inlet and outlet. These gaskets are in the form of flat washers having 9-inch outside diameter and 4-inch inside diameter. Figure 3 shows the containing shell and the strainer-cloth supporting frame fabricated and ready for installation in the system.

A rectangular piece of cloth 19 × 31 inches is required to make the cylindrical strainer sleeve. To make the sleeve, fold the cloth so that it forms a $9\frac{1}{2}$ × 31-inch rectangle and sew together three-quarters of an inch from the open 31-inch side using a short stitch. This prevents the cloth from pulling open at the seam under operating pressure of 35 p.s.i. or less. The cloth cylinder is mounted in the supporting framework by inserting it through the center and folding the ends back over the outside of the framework end rings. The "O" rings are then stretched over the end rings and cloth so that the cloth is held in place when the framework is being inserted or removed from the containing shell. A cloth sleeve mounted in the supporting frame is shown in figure 4.

Several types of cloth are suitable for the strainer cloth. A material that has a mesh with the proper size opening to meet the desired grade requirements must be chosen. The size of opening may vary considerably in different types of cloth of the same mesh because of difference in the thread diameter. A cloth that will not stretch should be used. Cloth made of nylon makes an excellent strainer. Nylon organdy, 80 × 100 mesh, has been used successfully; it withstands higher line pressure than some other types of nylon.

The following materials are needed to build a strainer:

- $27\frac{3}{4}$ inches, type 304 stainless steel tubing, 7-inch outside diameter, 11-gage wall
- Four pieces 11-gage, type 304 stainless steel sheet, 9-inch diameter round
- 12 inches, type 304 stainless steel tubing, $1\frac{1}{4}$-inch outside diameter (or diameter to match flow lines), 18-gage wall
- 6 inches, type 304 stainless steel tubing, $5\frac{9}{16}$-inch outside diameter, 0.258-inch wall or 5-inch schedule 40 pipe
- 32 feet, type 304 stainless steel rod, $\frac{3}{16}$-inch diameter (16 rods, $23\frac{1}{2}$ inches long)
- Two pieces $\frac{1}{4}$-inch-thick neoprene sheet, 9-inch diameter round (made into flat washer gaskets, 9-inch outside diameter, 4-inch inside diameter)
- Two neoprene "O" rings, $5\frac{1}{4}$-inch outside diameter, 5-inch inside diameter
- Sixteen roundhead machine screws, $\frac{1}{4}$-20 NC–$\frac{3}{4}$-inch long, with wing nuts, type 304 stainless steel
- One air cock, $\frac{1}{8}$-inch, bronze
- One piece cloth, 19 × 31 inches (nylon organdy, 80 × 100 mesh, or other suitable material)

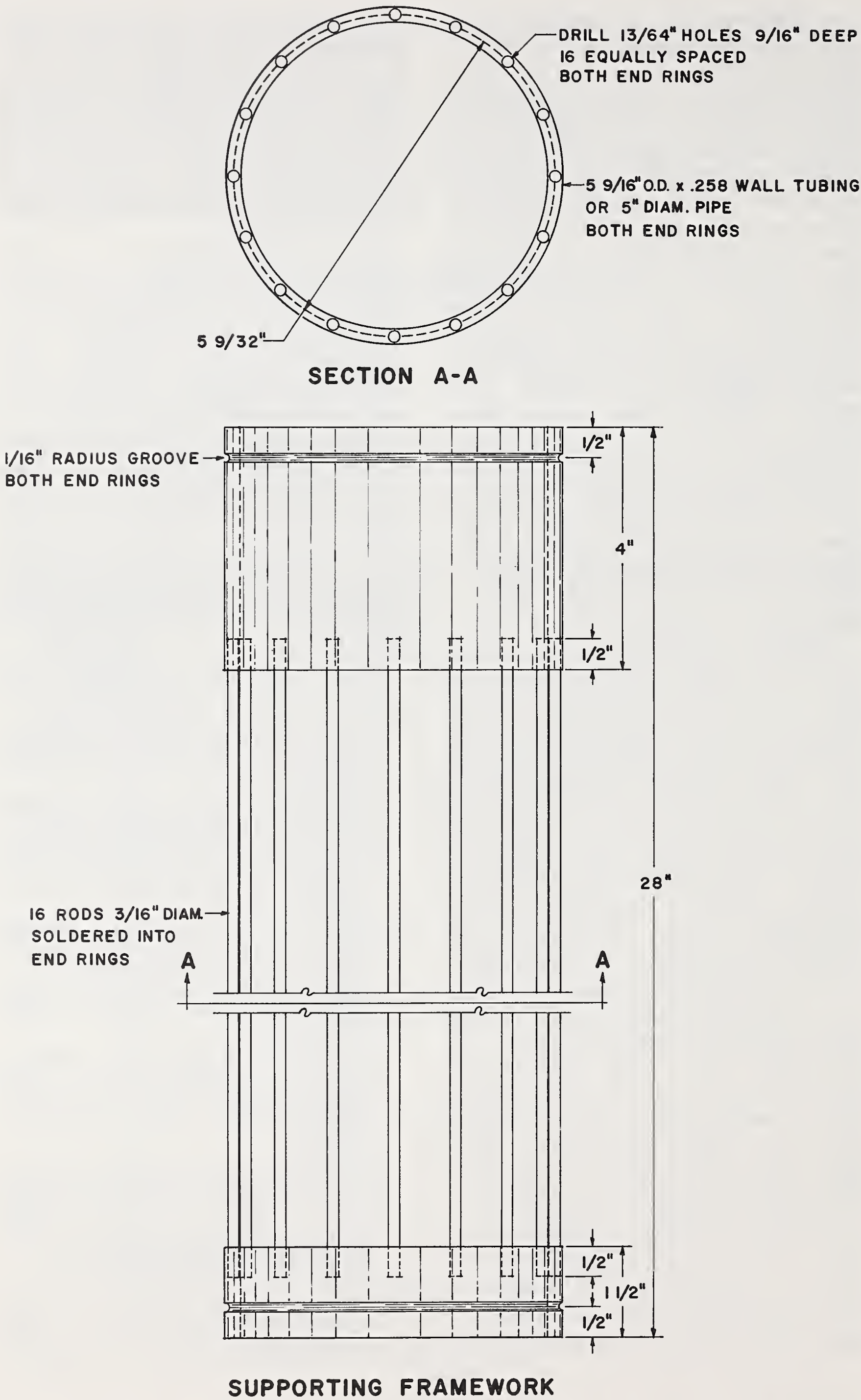

FIGURE 2.—Diagrams showing construction details of the strainer-cloth supporting frame.

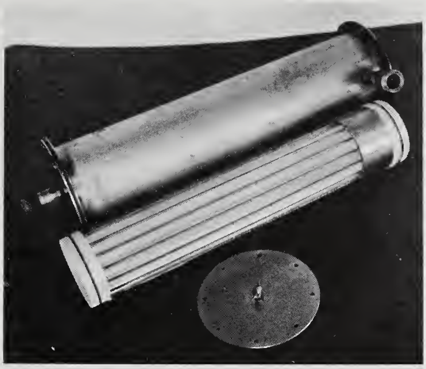

FIGURE 3.—Containing shell (rear) with top cover plate removed and strainer-cloth supporting frame.

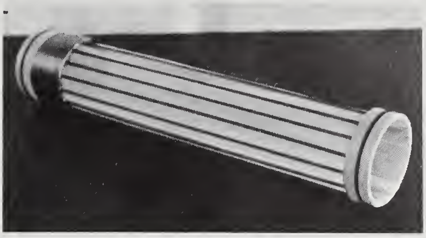

FIGURE 4.—Strainer-cloth supporting framework, containing the strainer cloth, ready to be inserted in the containing shell.

INSTALLATION AND OPERATION

A desirable installation contains four strainer units arranged in pairs so that the flow can be directed through either pair (fig. 5). This makes it possible to change or clean a strainer cloth in one pair while the other is in operation. The second strainer in each pair is used as a precautionary measure in case the cloth in the first strainer should become plugged and should rupture. A pressure gage in the flow line ahead of the strainers indicates a plugged strainer cloth. As the cloth accumulates material the line pressure increases. A sudden pressure drop indicates a rupture in the strainer cloth. A short section of glass tubing in the discharge line from each strainer permits visual checking for foreign material passing the strainer.

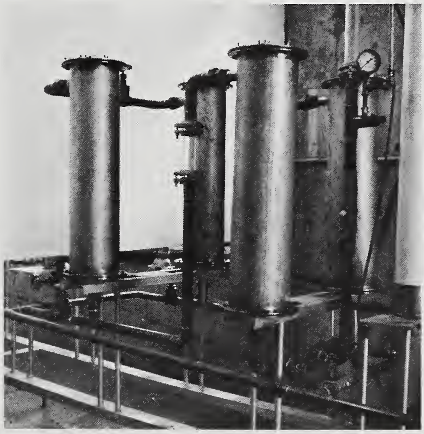

FIGURE 5.—An installation with two pairs of strainers in a continuous-flow system. Sections of glass tubing in the discharge line from each strainer provides visual inspection. The line pressure gage ahead of the strainers is visible.

The strainers are installed in the system in a vertical position with the inlet at the bottom and the outlet near the top. A stop cock in the top cover makes it possible to bleed off air when filling the strainer and to introduce air when the strainer is being drained. A drain from the strainer back to the sump must be provided so that the unit can be emptied for cleaning or at any time the system is shut down.

Straining is greatly facilitated if the honey is preheated to 110° to 120° F. Prescreening through coarse screens, 16-mesh or larger, at

or ahead of the sump removes coarse particles of wax; thus, the strainers will not need cleaning so often.

When the strainer cloth becomes plugged and requires cleaning, it is necessary to change the flow to the second pair of strainers and drain the pair with the plugged cloth. The top cover is removed, and the supporting framework containing the plugged strainer cloth is lifted out. The strainer cloth is removed from the supporting framework and a clean one installed. The framework containing the clean strainer cloth is then replaced in the containing shell, and the top cover is replaced. The plugged cloth may be cleaned for reuse by washing in cold water if it is not ruptured.

CAPACITY

The strainer described has 430 square inches of straining area. It has been used in a continuous-flow system where the combs were uncapped with a jiggler-type uncapping knife and the honey was prescreened through a 16-mesh screen in the sump. A concentric-tube preheater placed immediately ahead of the strainers was used to raise the honey temperature to 115° F. A nylon organdy strainer cloth, 80 × 100 mesh, was used. Under these conditions 5,000 pounds of honey were strained to meet Grade A standards before exchange of cloth was required. The strainer cloth safely withstood a line pressure of 35 pounds per square inch. The capacity will vary under other operating procedures. Careful attention is required when the strainers are first used in any system.

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